CLAIMS

1. An internal combustion engine with at least one engine member, the engine member including:

- a combustion chamber (4) of a combustible mixture with fuel and oxidant components fitted with a compression system (9),
- an ignition system (7) of the combustible mixture by an igniter,
- sequential let-through devices for the fuel and oxidant components and for the combustion products,

the engine being of the supercharging type by boost pressure of the oxidant components upstream of the engine member,

characterised in that the fuel is exclusively liquid, notably petrol, and the ignition system includes a closed head (6)(12a) substantially spherical with a wall enclosing the igniter in a precombustion chamber (1), the head including a set of orifices (5) intended to communicate the combustion chamber and the precombustion chamber so that combustible mixture may flow into the precombustion chamber.

2. An engine according to claim 1, characterised in that at least one orifice (5a) has dimensions of passageway letting through a flame front from the precombustion chamber (1) to the combustion chamber.

3. An engine according to the claim 1 or 2, characterised in that at least one orifice (5b) has dimensions of passageway not letting through a flame front from the precombustion chamber (1) to the combustion chamber (4) while letting through unstable species resulting from the combustion in the precombustion chamber in order to enable self-ignition of the combustible mixture of the combustion chamber.

4. An engine according to claim 3, characterised in that the set of orifices have dimensions of passageway not letting through the flame front from the precombustion chamber to the combustion chamber while letting through unstable species.

5. An engine according to claim 3 or 4, characterised in that each orifice not letting through the flame front has a diameter smaller than 1 mm.

6. An engine according to one of the claims 3, 4 or 5, characterised in that each orifice has a length smaller than its diameter.

7. An engine according to any of the previous claims, characterised in that the separation wall between the precombustion chamber (1) and the combustion chamber (4) of the head (12a) is made of a material with thermal conductivity greater than 10W/K/m.

8. An engine according to any of the previous claims, characterised in that the separation wall between the precombustion chamber (1) and the combustion chamber (4) of the head (12a) is made of high conductivity copper alloy (CuCr1Zr).

9. An engine according to any of the previous claims, characterised in that the orifices of the precombustion chamber of the head are minimum three in number.

10. An engine according to any of the previous claims, characterised in that it is with direct injection of the fuel components in the combustion chamber.

11. An engine according to claim 10, characterised in that the compression system is a piston (9) in a cylindrical combustion chamber (4) with central axis, at least one of the let-through devices being a direct injector (8) in the combustion chamber for, in all or in part, the fuel and/or oxidant components, the injector being arranged substantially axially opposite the piston and the ignition system (7) laterally with respect to the injector, and in that the orifices are predominantly arranged axially to ensure homogeneity of the combustion of the combustible mixture substantially in the whole combustion chamber.

12. An engine according to any of the claims 1 to 10, characterised in that the compression system is a piston (9) in a cylindrical combustion chamber (4) with central axis, at least one of the

let-through devices being a direct injector (8) in the combustion chamber for, in all or in part, the fuel and/or oxidant components, the ignition system (7) being arranged substantially axially opposite the piston and the injector laterally with respect to the ignition system, and in that the orifices are distributed regularly on the surface of the head to ensure homogeneity of the combustion of the combustible mixture substantially in the whole combustion chamber.

13. An engine according to any of the claims 1 to 10, characterised in that the compression system is a piston in a cylindrical combustion chamber (4) with central axis, at least one of the let-through devices being a direct injector (8) in the combustion chamber for, in all or in part, the fuel and/or oxidant components, the injector and the ignition system (7) being arranged laterally with respect to said axis, and in that the orifices are predominantly arranged axially to ensure homogeneity of the combustion of the combustible mixture substantially in the whole combustion chamber.

14. An engine according to any of the claims 10 to 13, characterised in that the head (6) is arranged on a portion of the path of the fuel components injected so that said head may be wetted by said fuel components during the direct injection thereof.

15. An engine according to any of the claims 10 to 14, characterised in that the richness of the mixture is greater than or equal to one in at least one embodiment of the engine.

16. An engine according to any of the previous claims, characterised in that the ignition system and its head are a single component which replaces a traditional sparking plug and which does not require any modification of the cylinder head passageway for the sparking plug.

17. A method of ignition of an internal combustion engine having at least one engine member, the engine member including:

- a combustion chamber (4) of a combustible mixture with fuel and oxidant components fitted with a compression system (9),
- an ignition system (7) of the combustible mixture by an igniter,
- sequential let-through devices for the fuel and oxidant components and for the combustion products,

the engine being of the supercharging type by boost pressure of the oxidant components upstream of the engine member,

characterised in that

- one implements an ignition system including a closed head (6), (12a) substantially spherical with a wall enclosing the igniter in a precombustion chamber (1), the head including a set of orifices (5) intended to communicate the combustion chamber and the precombustion chamber so that combustible mixture may flow into the precombustion chamber,
- one introduces in the combustion chamber the fuel components and the oxidant components which form the combustible mixture in the combustion chamber, the fuel being exclusively liquid, notably petrol,
- one causes an ignition of the combustible mixture in the precombustion chamber by the igniter, the orifices of the precombustion chamber enabling the ignition of the combustible mixture of the combustion chamber.

18. A method according to claim 17 characterised in that one lets through the orifices (5b) of the unstable species resulting from the combustion in the precombustion chamber in order to enable self-ignition of the combustible mixture of the combustion chamber without however letting through the flame front from the precombustion chamber to the combustion chamber.

19. An application of the method according to claim 17 to the engine of any of the claims 1 to 16.